



**AFO485-A : FIBRE OPTIC MODEM**  
**RFO485-A : FIBRE OPTIC REPEATER**

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**USER GUIDE**  
Doc. ref : 9013009-01

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The AFO485-A and RF0485-A units are manufactured by

## **ETIC TELECOMMUNICATIONS**

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The present document describe how to install and operate the following products

AFO485-AST•• or AFO485-ASC••	20	30	40	50	60	70
Point to point transmission	•	•	•	•	•	•
RS485 half-duplex	•	•	•	•	•	•
RS232 – RS422 full duplex	•	•	•	•	•	•
PROFIBUS - MODBUS – UNITELWAY – DH485	•	•	•	•	•	•
Other asynchronous protocols	•	•	•	•	•	•
Multimode fibre optics	•					
Single mode fibre optics		•	•	•	•	•
1300 nm optical source	•	•	•	•	•	•
Min. guaranteed optical power budget at 25°C (dB) Taking into account losses due to the connector.	11	19	12	30	34	37
Transmission failure output	•	•	•	•	•	•
Double DC power supply input	•	•	•	•	•	•

RFO485-AST•• or RFO485-ASC••	22	33	44	55	66	77
Point to point / Bus / failsafe ring	•	•	•	•	•	•
RS232 – RS422 - RS485 half-duplex	•	•	•	•	•	•
PROFIBUS DP MODBUS – UNITELWAY – DH485	•	•	•	•	•	•
Other half-duplex asynchronous protocols	•	•	•	•	•	•
Multimode fibre optics	•					
Single mode fibre optics		•	•	•	•	•
1300 nm optical source	•	•	•	•	•	•
Min. guaranteed optical power budget at 25°C (dB) Taking into account losses due to the connector.	12	19	12	30	34	37
Transmission failure output	•	•	•	•	•	•
Double DC power supply input	•	•	•	•	•	•

### Important notice :

Because of the high power of their emitting optical source, the most powerful products must not be connected at short distance through the Fiber optic. Please refer to § 2.11 (AFO485) or 3.10 (RFO485) for more information.



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- Appendix 3 : RS485 – RS422 interfaces



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## **1 Overview**

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The family of AFO485-A fibre optic modems and RFO485-A fibre optic repeaters allow the transmission of RS232/RS485/RS422 asynchronous data via multimode or single mode fibre optics.

### **Field bus network**

The units allow the fibre optic transmission of PROFIBUS DP, MODBUS, UNITELWAY, SYSMACWAY, DH485, and the majority of asynchronous protocols.

### **Local Interface**

The unit provides an RS232, RS422 and RS485 local interface.

### **Point to point transmission (AFO485-A)**

The AFO485-A models allow point to point links using **full-duplex or half-duplex protocols**.

### **Bus and failsafe ring (RFO485-A)**

The RFO485-A models have a repeater function and allow a multidrop link or a failsafe ring to be established using **half-duplex protocols only**.

### **Line modulation**

The data over the fibre optic is encoded to ensure a range of up to 68 km for models which use single mode fibres.

### **Transmission failure Information**

In case of a cut in the fibre optic link the unit provides a transmission failure output.

### **Double DC supply input**

Two power supply inputs are provided in order to back-up one of the power sources in case of failure or to replace one power source with another without interfering with the units functioning.



## 2 AFO485-A modem

### Important preliminary notice :

Because of the high power of their emitting optical source, the most powerful products must not be connected at short distance through the fiber optic. Please refer to § 2.11 for more information.

### 2.1. Function

The AFO485-A product allows point to point transmission via multimode or single mode fiber optics.

It provides RS232, RS485 and RS422 asynchronous interfaces.

The unit permits half-duplex transmission over the RS485 interface or full-duplex transmission over the RS232 or RS422 interfaces.

The following protocols may be used :

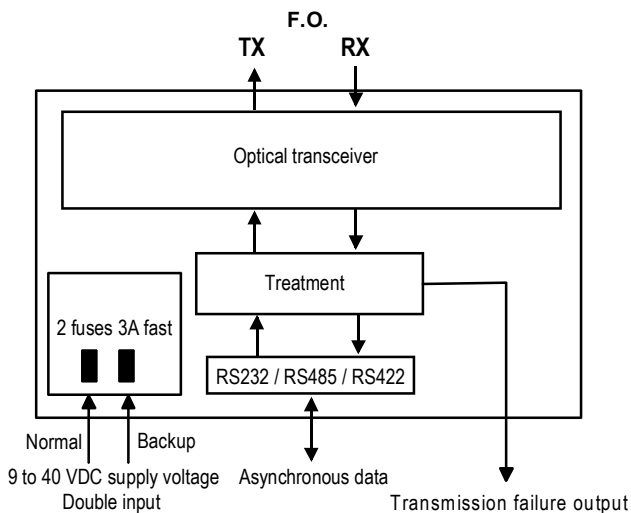
PROFIBUS / MODBUS / UNITEWAY / SYSMACWAY / DH485 and the majority of other asynchronous protocols.



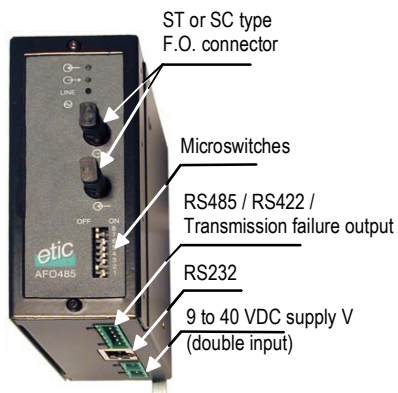





The tables below show the functionalities of each of the available models.

AFO485-AST•• or AFO485-ASC••	20	30	40	50	60	70
Point to point transmission	•	•	•	•	•	•
RS485 half-duplex	•	•	•	•	•	•
RS232 – RS422 full duplex	•	•	•	•	•	•
PROFIBUS - MODBUS – UNITELWAY – DH485	•	•	•	•	•	•
Other asynchronous protocols	•	•	•	•	•	•
Multimode fibre optics	•					
Single mode fibre optics		•	•	•	•	•
1300 nm optical source	•	•	•	•	•	•
Min. guaranteed optical power budget at 25°C (dB) Taking into account losses due to the connector.	11	19	12	30	34	37
Transmission failure output	•	•	•	•	•	•
Double DC power supply input	•	•	•	•	•	•

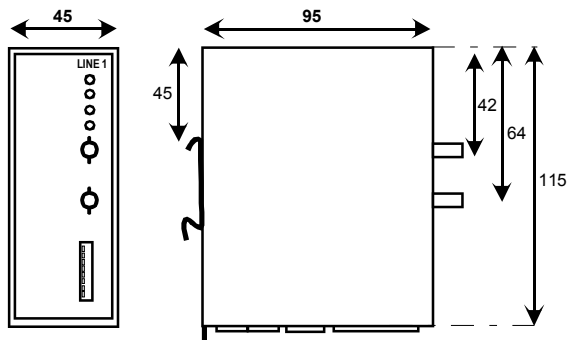


## 2.2. Description



Leds	
	Characters transmitted to the fiber optic.
	Characters received from the fiber optic.
<b>LINE</b>	Lit when two AFOs communicate correctly, even when no character is received. Otherwise off.
	Power on.

Dimensions in mm



## 2.3. Micro-switches

SWITCH 1 : Loop 2B	
	switch 1
The product is ready for normal operations Loop 2B is not active	OFF
Loop 2B is active for test purpose	ON

SWITCHES 2 / 3 / 4			
switches	2	3	4
Mandatory positioning	OFF	OFF	OFF

SWITCHES 5 to 8 : RS232, RS485 or RS422 data rate					
		5	6	7	8
Profibus DP	1.5 Mb/s	OFF	ON	OFF	OFF
Profibus DP	500 Kb/s	OFF	ON	OFF	ON
Profibus DP	187 500 b/s	OFF	ON	ON	OFF
	115 200 b/s	ON	OFF	OFF	OFF
Profibus DP	93 750 b/s	OFF	ON	ON	ON
	57 600 b/s	ON	OFF	OFF	ON
	38 400 b/s	ON	OFF	ON	OFF
	19 200 b/s	ON	OFF	ON	ON
	9 600 b/s	ON	ON	OFF	OFF
	4 800 b/s	ON	ON	OFF	ON
	2 400 b/s	ON	ON	ON	OFF
	1 200 b/s	ON	ON	ON	ON

## 2.4. Connectors

<b>Connector 1 : 2 point screw terminal</b> <b>Main power supply voltage</b>		
Pin	Signal	Function
1	V+	Voltage: 9 to 40 VDC - 170 mA / 24 VDC
2	GND	Signal ground

<b>Connector 2 : 2 point connector terminal</b> <b>Backup power supply voltage</b>		
Pin	Signal	Function
1	V+	Voltage : 9 to 40 VDC - 170 mA / 24 VDC
2	GND	Signal ground

<b>Connector 3 : RJ45 local interface connector</b> <b>non-isolated RS232</b>				
Pin	Circuits		Designation	Terminal-Modem
1	CD	109	Carrier	←
2	RX	104	Data reception	←
3	TX	103	Data transmission	⇒
4			Not connected	
5	SG	102	Signal ground	
6	DSR	107	Data set ready	←
7			Not connected	
8	CTS	106	Clear to send	←

Note : The CAB593 cable provides an RS232 DB9 female, instead of the RJ45 connector. It must be ordered separately. The wiring of the CAB593 / RS232 cable is given in appendix 1.

<b>Connector 4 : 6 point connector terminal</b> <b>RS485 and RS422 local interface non isolated and dry contact</b>		
Pin	Signal	Function
1	F-	Transmission failure contact, <b>polarity -</b> Maximum differential voltage = 50 VDC I max = 600 mA
2	F+	Transmission failure contact, <b>polarity +</b>
3	RS422 B'	Emission RS422 polarity B (To the AFO485A)
4	RS422 A'	Emission RS422 polarity A (To the AFO485A)
5	RS485 B	Reception RS422 polarity B (To the local terminal) or RS485 polarity B
6	RS485 A	Reception RS422 polarity A (To the local terminal) or RS485 polarity A

## **2.5. Asynchronous Interfaces**

At each end, the asynchronous interface used can be different; for example, the first modem can be linked to the PC using the RS232 interface while the second AFO485-A can be connected to a PLC using the RS485 or RS422 interface.

### **RS232 Interface**

The RS232 interface is available on the RJ45 plug.

The CAB593 cable has a DB9 female connector for the RS232 link. It must be ordered separately (see appendix 2).

The interface can be used as well with a duplex or half-duplex protocols. No control signal from the RS232 terminal (DTE) is necessary.

The CD and DSR and CTS signals are closed by the AFO485-A as soon as the modem receives the modulation from the remote AFO485-A.

### **RS422 interface**

The RS422 interface (4 wires) is available on the 6 point screw terminal.

This interface are not opto-isolated and must be used for short distances.

The matching resistors of the bus are not included in the product.

The diagram of the interface is given in appendix 3.

### **RS485 interface**

The RS485 interface (2 wires) is available on the 6 point screw terminal.

This interface is not opto-isolated and must be used for short distances.

The matching resistor of the bus is not included in the product.

The diagram of the interface is given in appendix 3.

## **2.6. Transmission failure output**

The transmission failure information is an output of the AFO485-A. It is available on pins 1 and 2 of the 6 points screw terminal.

**The transmission failure output is closed** when the modulation of the remote modem has been detected even if no data is received from the fibre optic; the “line” led is lit.

**The transmission failure output is opened** as soon as the modulation is no longer received or when the power is off; the “line” led is extinguished.

## **2.7. Supply voltage**

The power supply voltage must be strictly regulated and maintained between 9 and 40 Volts maximum.

Two DC power supply inputs are available ; if the primary power source fails the second can continue to provide power to the unit.

The consumption is 170 mA at 24 VDC supply voltage.

## **2.8. Fuse**

Each supply voltage input is equipped with a 3 Ampere fast fuse.

To check or change the fuse, open the modem; the fuses are located on the circuit board, in front of the supply voltage connector.

## 2.9. Range over the F.O.

The range depends on the product and the type of fibre used.

### Range between 2 modems using multimode fibre G50/125

	Optical Source	Optical power*	Reserve	F.O. attenuation	Min. range
		dB	dB	dB/Km	Km
Product Reference		A	B	C	$D1 = (A-B) / C$
AFO485-AST20	1300 nm	8,5	3	1	5,5

### Range between 2 modems using multimode fibre G62.5/125

	Optical Source	Optical power*	Reserve	F.O. attenuation	Min. range
		dB	dB	dB/Km	Km
Product Reference		A	B	C	$D1 = (A-B) / C$
AFO485-AST20	1300 nm	11	3	1,5	5,3

### Range between 2 modems using single mode fibre E10/125

	Optical Source	Optical power*	Reserve	F.O. attenuation	Min. range
		dB	dB	dB/Km	Km
Product Reference		A	B	C	$D1 = (A-B) / C$
AFO485-AST30	1300 nm	19	3	0,5	32
AFO485-AST40	1300 nm	12	3	0,5	18
AFO485-AST50	1300 nm	30	3	0,5	54
AFO485-AST60	1300 nm	34	3	0,5	62
AFO485-AST70	1300 nm	37	3	0,5	68

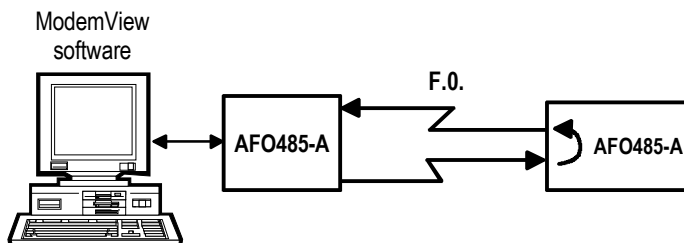
\* Minimum guaranteed power of the optical source at 25°C.

## 2.10. Bringing a loop into service

A 2B loop can be brought into service placing the switch 1 ON .

In that case, any data received through the RX F.O. is automatically sent back to the TX F.O.

This allows for example to evaluate the error rate on the network using an asynchronous analyser or the ETIC ModemView software.



## 2.11. Installation

### DIN rail mounting

The product was designed to be mounted on a 35mm DIN rail.

### Overheating

To avoid overheating, in particular when the temperature in the cabinet is liable to rise, a space of 1cm on either side of the unit should be left to allow the heat to escape.

### Curvature of the F.O.

Sufficient space should also be left in front of the unit in order to account for the minimum radius of curvature prescribed by the manufacturer of the fibre optic cable.

### Optical connectors

You should avoid using excessive force while connecting the fibre optic cables to avert damage to the optical connectors.

### Minimum acceptable distance through the F.O.

**!! The most powerful products must not be connected at short distance through the F.O..**

The optical power must be attenuated as follows :

	Minimum attenuation	Minimum distance * between 2 products of the same reference with 0,5 dB / Km F.O.
	dB	Km
AFO485-50AST AFO485-50ASC	2	4
AFO485-60AST AFO485-60ASC	5	10
AFO485-70AST AFO485-70ASC	7	14

## 3 RFO485-A repeater

### Important preliminary notice :

Because of the high power of their emitting optical source, the most powerful products must not be connected at short distance through the fiber optic. Please refer to § 3.10 for more information.

### 3.1. Function

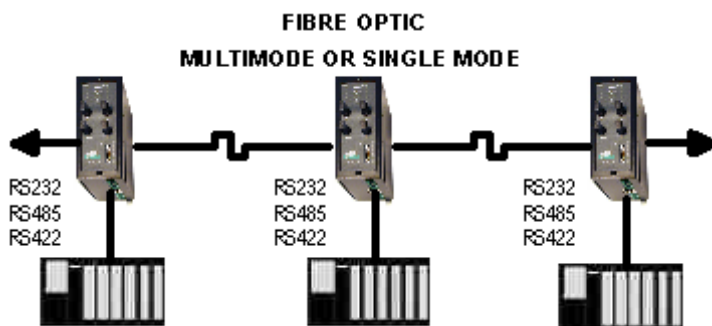
These products allow the repetition of data from one optical link to another as well as to an asynchronous local interface.

The following protocols can be transmitted :  
PROFIBUS DP / MODBUS / UNITELWAY / SYSMACWAY, as well as most other asynchronous protocols.

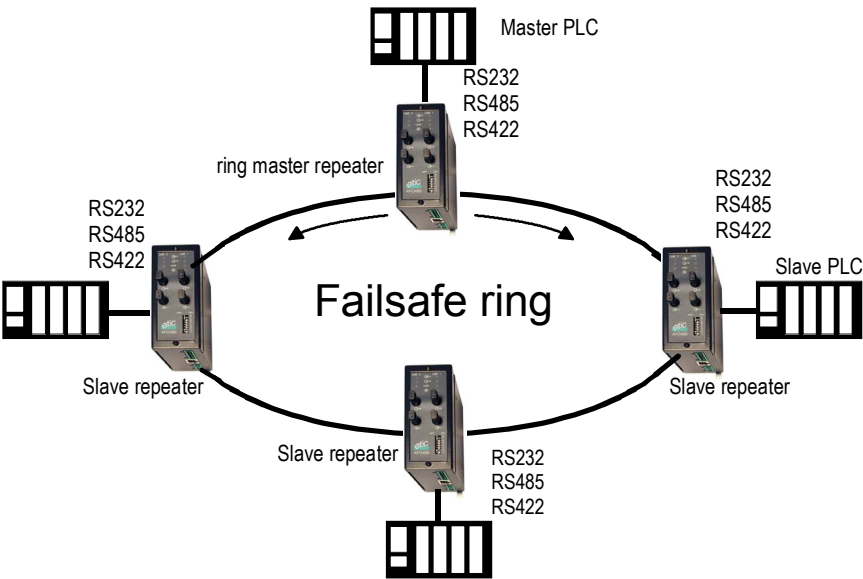
The local interface is RS232, RS485 or RS422. **These interfaces just accept half-duplex protocols.**

The repeaters allow for the creation of a bus network or a failsafe ring.

#### 3.1.1 BUS operations



3.1.2 Failsafe ring operations



One RFO485-A unit must be designated as a « ring master » ;This must be the unit which is connected to the master PLC of the network.  
The role of Master PLC can only be given to one PLC.

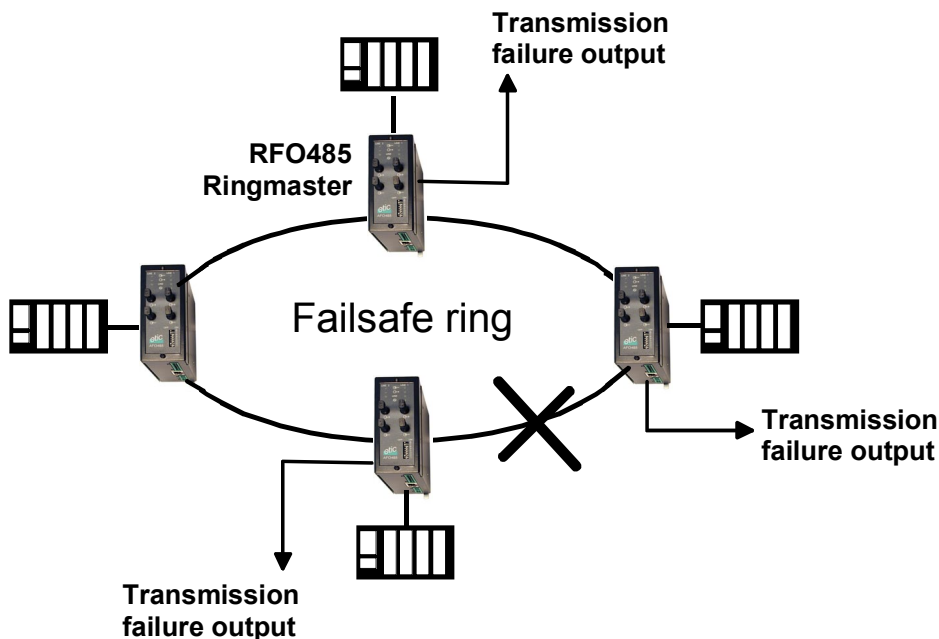
Any frame is transmitted over the ring in both of the two possible directions.

The table below shows the characteristics of the available models :

RFO485-AST•• or RFO485-ASC••	22	33	44	55	66	77
Point to point / Bus / failsafe ring	•	•	•	•	•	•
RS232 – RS422 - RS485 half-duplex	•	•	•	•	•	•
PROFIBUS DP MODBUS – UNITELWAY – DH485	•	•	•	•	•	•
Other half-duplex asynchronous protocols	•	•	•	•	•	•
Multimode fibre optics	•					
Single mode fibre optics		•	•	•	•	•
1300 nm optical source	•	•	•	•	•	•
Min. guaranteed optical power budget at 25°C (dB) Taking into account losses due to the connector.	12	19	12	30	34	37
Transmission failure output	•	•	•	•	•	•
Double DC power supply input	•	•	•	•	•	•

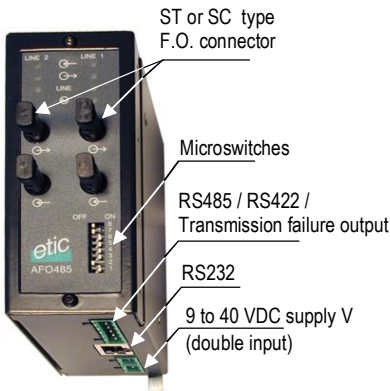
When a segment of the fibre optic cable is faulty, this system allows all units to nevertheless continue receiving information.

If a failure occurs, the alarm output of the «ring master» RFO485-A is opened as well as the alarm outputs of the RFO485-A modules connected to the segment of fibre optic in failure.

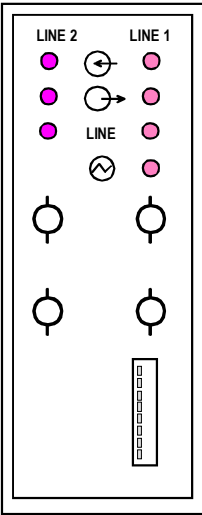




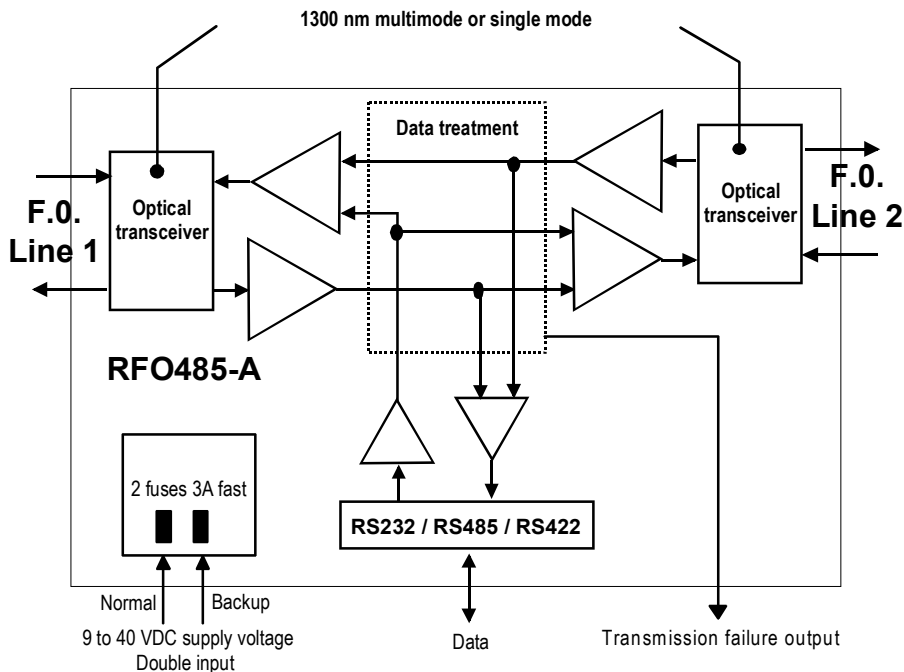
3.2. Description



7 leds in total for the 2 optical lines allow for easy monitoring of the units behaviour:



Leds	
	Characters sent to the fibre optic. (LINE 1 or LINE 2)
	Characters received from the fibre optic. (LINE 1 or LINE 2)
LINE	Lit when the optical data link between 2 RFO485-A is established even if no character is sent or received. Otherwise off.
	Power on.



### 3.3. Micro-switches

SWITCHES 1 and 2 : TYPE OF NETWORK See § 3.9		
	switches	
	1	2
Multidrop (= bus repeater) or failsafe ring / slave	ON	OFF
Short range failsafe ring / master <b>Silence time TS on the ring is greater than 1 character lengths</b>	OFF	ON
Long range failsafe ring / master <b>Silence time TS on the ring is greater than 2 character lengths</b>	OFF	OFF
Very long range failsafe ring / master <b>Silence time TS on the ring is greater than 4 character lengths</b>	ON	ON

SWITCH 3 : REGENERATION of CHARACTERS	
	switch
	3
The bytes are regenerated when passing through the repeater	ON
The bytes are transparently repeated	OFF

SWITCH 4 : FORMAT ON THE ASYNCHRONOUS LINK RS232, RS485 OR RS422		
	switch	
	4	
8 bits without parity or 7 bits + parity	1 start + 1 stop	ON
8 bits + parity	1 start + 1 stop	OFF

SWITCHES 5 to 8 : RS232 RS485 RS422 DATA RATE					
		5	6	7	8
Profibus DP	1.5 Mb/s	OFF	ON	OFF	OFF
Profibus DP	500 Kb/s	OFF	ON	OFF	ON
Profibus DP	187 500 b/s	OFF	ON	ON	OFF
	115 200 b/s	ON	OFF	OFF	OFF
Profibus DP	93 750 b/s	OFF	ON	ON	ON
	57 600 b/s	ON	OFF	OFF	ON
	38 400 b/s	ON	OFF	ON	OFF
	19 200 b/s	ON	OFF	ON	ON
	9 600 b/s	ON	ON	OFF	OFF
	4 800 b/s	ON	ON	OFF	ON
	2 400 b/s	ON	ON	ON	OFF
	1 200 b/s	ON	ON	ON	ON

### 3.4. Connectors

Connector 1 : 2 point screw terminal Main power supply		
Pin	Signal	Function
1	V+	Power supply voltage 9 to 40 VDC - 250 mA at 24 VDC
2	GND	Signal ground

Connector 2 : 2 point connection terminal Backup power supply		
Pin	Signal	Function
1	V+	Power supply voltage 9 to 40 VDC - 250 mA at 24 VDC
2	GND	Signal ground

Connector 3 : RJ45 local interface connector non-isolated RS232			
Pin	Circuits		Terminal-Modem
1	CD	109	Carrier
2	RX	104	Data reception
3	TX	103	Data transmission
4			Not connected
5	SG	102	Signal ground
6	DSR	107	Data set ready
7			Not connected
8	CTS	106	Clear to send

Note : The CAB593 cable provides an RS232 DB9 female, instead of the RJ45 connector. It must be ordered separately. The wiring of the CAB593 / RS232 cable is given in appendix 1.

Connector 4 : 6 point connector terminal RS485 and RS422 non isolated and Transmission failure output		
Pin	Signal	Function
1	F-	Transmission failure contact, <b>polarity -</b> Vmax = 50 VDC I max = 600 mA
2	F+	Transmission failure contact, <b>polarity +</b>
3	RS422 B'	Emission ; RS422 polarity B (to the RFO485A)
4	RS422 A'	Emission ; RS422 polarity A (to the RFO485A)
5	RS485 B	Reception ; RS422 polarity B (to the local terminal) or RS485 polarity B
6	RS485 A	Reception ; RS422 polarity A (to the local terminal) or RS485 polarity A

### 3.5. Asynchronous Interfaces

The RS232, RS485 and RS422 interfaces **just accept half-duplex protocols**.

On each product, the asynchronous interface used can be different; for example, the first modem can be linked to the PC using the RS232 interface while the second RFO485-A can be connected to a PLC using the RS485 or RS422 interface.

#### **RS232 Interface**

The RS232 interface is available on the RJ45 plug.

The CAB593 cable has a DB9 female connector for the RS232 link. It must be ordered separately (see appendix 2).

No control signal from the RS232 terminal (DTE) is necessary.

The CD and DSR and CTS signals are closed by the RFO485-A as soon as the modem receives the modulation from the remote RFO485-A.

#### **RS422 interface**

The RS422 interface (4 wires) is available on the 6 points screw terminal.

This interface is not opto-isolated and must be used for short distances.

The matching resistors of the bus are not included in the product.

The diagram of the interface is given in appendix 3.

#### **RS485 interface**

The RS485 interface (2 wires) is available on the 6 point screw terminal.

This interface is not opto-isolated and must be used for short distances.

The matching resistor of the bus is not included in the product.

The diagram of the interface is given in appendix 3.

## 3.6. Transmission failure output

### 3.6.1 Bus network

**The transmission failure contact is opened** as soon as the modulation is lost on one of the two “Receive” optical links to which the repeater is connected or if the repeater is powered off.

The corresponding led ( line 1 or 2) is extinguished.

**The transmission failure output is closed** when a repeater detects the modulation on the two “Receive” optical links to which it is connected, even if no data is received on either of the two lines.

The leds “lines 1 and 2” are lit.

### 3.6.2 Failsafe ring

#### - « Ringmaster » repeater

**The Transmission failure output is opened**

when the modulation is lost on one of the 2 “Receive” optic lines to which the repeater is directly connected.

In that situation, the corresponding led (line 1 or 2) is extinguished.

Or when a failure occurs on the ring.

Or if the unit is powered off.

**The Transmission failure output is closed when no failure has been detected by the ring master module.**

#### - Other repeaters in the ring

**The transmission failure contact is opened** as soon as the modulation is lost on one of the two “Receive” optical links to which the repeater is connected or if the repeater is powered off.

The corresponding led ( line 1 or 2) is extinguished.

**The transmission failure output is closed** when a repeater detects the modulation on the two “Receive” optical links to which it is connected, even if no data is received on either of the two lines.

The leds “lines 1 and 2” are lit.

### 3.7. Supply voltage

The power supply voltage must be strictly regulated and maintained between 9 and 40 Volts maximum.

Two DC power supply inputs are available ; if the primary power source fails the second can continue to provide power to the unit.

The consumption of 1 repeater is 250 mA at 24 VDC supply voltage.

### 3.8. Fuse

Each supply voltage input is equipped with a 3 Ampere fast fuse.

To check or change the fuse, open the modem; the fuses are located on the circuit board, in front of the supply voltage connectors.

## 3.9. Fibre optic range

### 3.9.1 Range between repeaters in a bus network

The maximum distance between 2 repeaters is dependant on the product and the type of fibre optic used; It is the same as that of a point to point link using the same fibre optic.

**Range between 2 modems using multimode fibre G50/125**

	Optical Source	Optical power*	Reserve	F.O. attenuation	Min. range
		dB	dB	dB/Km	Km
Product Reference		A	B	C	D1 = (A-B) / C
<b>RFO485-AST20</b>	1300 nm	8,5	3	1	5,5

**Range between 2 modems using multimode fibre G62.5/125**

	Optical Source	Optical power*	Reserve	F.O. attenuation	Min. range
		dB	dB	dB/Km	Km
Product Reference		A	B	C	D1 = (A-B) / C
<b>RFO485-AST20</b>	1300 nm	11	3	1,5	5,3

**Range between 2 modems using single mode fibre E10/125**

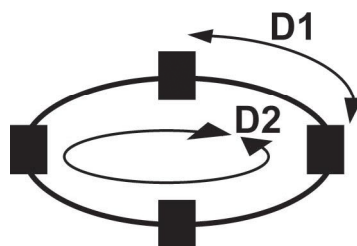
	Optical Source	Optical power*	Reserve	F.O. attenuation	Min. range
		dB	dB	dB/Km	Km
Product Reference		A	B	C	D1 = (A-B) / C
<b>RFO485-AST30</b>	1300 nm	19	3	0,5	32
<b>RFO485-AST40</b>	1300 nm	12	3	0,5	18
<b>RFO485-AST50</b>	1300 nm	30	3	0,5	54
<b>RFO485-AST60</b>	1300 nm	34	3	0,5	62
<b>RFO485-AST70</b>	1300 nm	37	3	0,5	68

\* Minimum guaranteed power of the optical source at 25°C.

### 3.9.2 Range of repeaters in a failsafe ring

Taking into account the algorithm of the failure detection used, the maximum size of the ring is determined in three stages :

**Step 1** : The distance D1 between 2 repeaters can not exceed the distances marked in the tables in § 3.9.1; these distances depend on the type of RFO485A and the fibre optic cable used.



**Step 2** : Moreover, the distance D1 between 2 repeaters can not exceed the values in the table below.

Maximum length of a segment of the ring	
Kb/s	D1 in Km
9,6	20,0
19,2	10,0
38,4	5,0
93,75	2,1
57,6	3,5
115,2	1,7
187,5	1,0
500	0,4
1500	0,1

**Step 3 : In addition**, the total length of the ring can not exceed the value D2 given by the formulas below.

$$D2 = 200 \times (10 - N) / R$$

If the silence time TS of the ring is greater than 1 characters length

The switch 1 must be placed OFF and the switch 2 ON.

$$D2 = 200 \times (20 - N) / R$$

If the silence time TS of the ring is greater than 2 characters length

The switches 1 and 2 must be placed OFF.

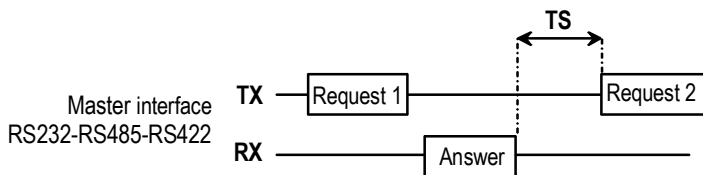
$$D2 = 200 \times (40 - N) / R$$

If the silence time TS of the ring is greater than 4 characters length

The switches 1 and 2 must be placed ON.

N= Number of repeaters

R (Kb/s) = data rate of the asynchronous link (between 1,2 and 1500)



## 3.10. Installation

### DIN rail mounting

The product was designed to be mounted on a 35mm DIN rail.

### Overheating

To avoid overheating, in particular when the temperature in the cabinet is liable to rise, a space of 1cm on either side of the unit should be left to allow the heat to escape.

### Curvature of the F.O.

Sufficient space should also be left in front of the unit in order to account for the minimum radius of curvature prescribed by the manufacturer of the fibre optic cable.

### Optical connectors

You should avoid using excessive force while connecting the fibre optic cables to avert damage to the optical connectors.

### Minimum acceptable distance through the F.O.

**!! The most powerful products must not be connected at short distance through the F.O..**

The optical power must be attenuated as follows :

	Minimum attenuation	Minimum distance * between 2 products of the same reference with 0,5 dB / Km F.O.
	dB	Km
RFO485-50AST RFO485-50ASC	2	4
RFO485-60AST RFO485-60ASC	5	10
RFO485-70AST RFO485-70ASC	7	14

Appendix 1 : CHARACTERISTICS	
Dimensions	115 x 48 x 97 mm (h, l, d)
E.M.I.	EN50082-2 / EN61000-4-5
Electrical security	EN 60950
Protection	IP30
Power supply / consumption	Double DC power supply 9 to 40 VDC AFO485-A : 170 mA /24 VDC – RFO485A : 250 mA / 24 VDC
Operating temp.	0°C/ + 60°C dry air
RS232	Non isolated Asynch. 7 or 8 bits + 1 start, 1 or 2 stops Parity : none / even / odd 1,2 to 115,2 kb/s
RS485 / RS422	Non isolated – Integrated polarisation Asynch. 7 or 8 bits + 1 start, 1 or 2 stops Parity : none / even / odd 1,2 to 115,2 - 93,5 - 187,5 - 500 - 1500 kb/s
Fieldbus	PROFIBUS DP, MODBUS, UNITELWAY, DH-485, SYSMAC-WAY,
Configuration	By switch
Type of fibre optic	Multimode G50/125 or G62,5/125 Single mode E10/125 Reception fibre and Emission fibre
Optical connector	ST or SC
Modulation	Online data coding
Alarm	<p>Transmission failure output :</p> <p><b>Point to point</b> : Open when the unit is no longer receiving power or if there is a reception failure.</p> <p><b>Bus topology</b>: Open when a carrier failure has been detected on one of the RX F.O. connected to the unit.</p> <p><b>Ring topology /« ring master» repeater</b>: Open when a carrier failure has been detected on any F.O. of the ring.</p> <p><b>Ring topology / any repeater</b>: Open when a carrier failure has been detected on one of the RX F.O. connected to the unit.</p>

## Appendix 2

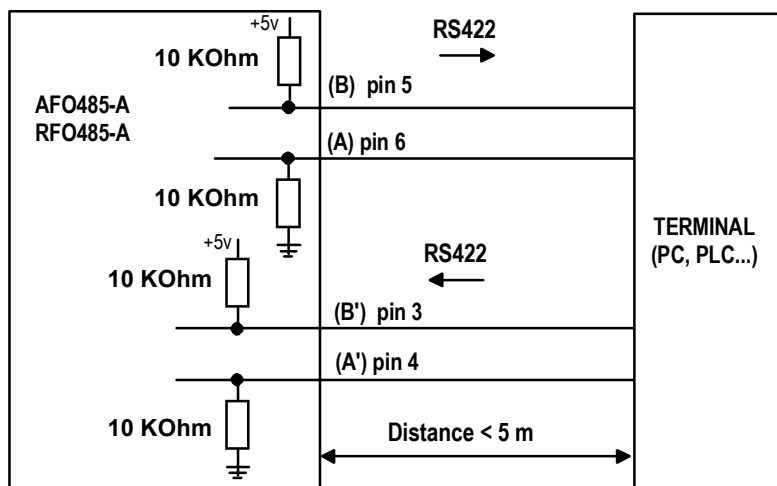
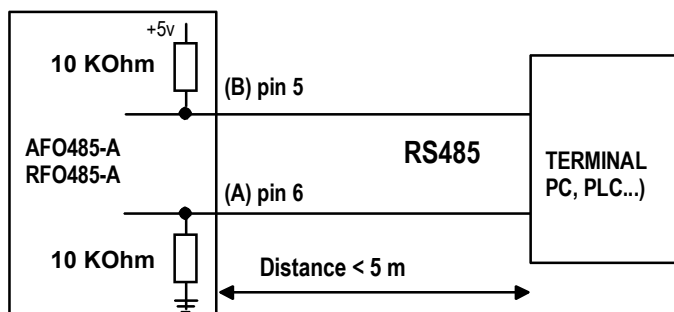
### RJ45 to DB9 female RS232 cable wiring

RJ45 to DB9 female RS232 cable wiring (ref : CAB593)					
RJ45 pin-out	DB9 fem. pin-out	Circuits		Designation	Terminal-Modem
1	1	CD	109	Carrier detect	←
2	2	RX	104	Data reception	←
3	3	TX	103	Data transmission	⇒
4				Not connected	
5	5	SG	102	Signal ground	
6	6	DSR	107	Data set ready	←
7				Not connected	
8	8	CTS	106	Clear to send	←

## Appendix 3

### RS485 or RS422 interfaces

The A and B signals of the RS485 / RS422 interfaces are polarised by the 2.2 Kohm resistors on the circuit board.



When the data rate is high or the length of the RS485 / RS422 bus justifies it, a 120 Ohm matching resistor should be attached to both ends of the network.





### Own comments

[illegible]



Own comments

A series of 20 horizontal lines for writing comments.





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